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PATENT ABSTRACTS OF JAPAN

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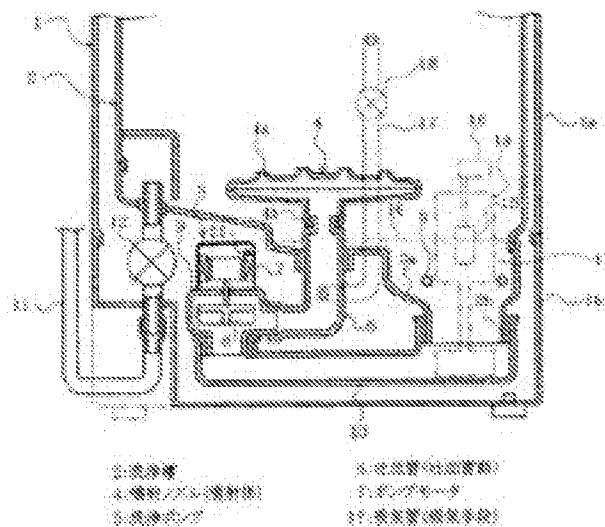
(72)Inventor : **SAGOU KOUJI**

(54) DISHWASHER

(57)Abstract:

PROBLEM TO BE SOLVED: To improve the washing power of a washing means for spraying air bubbles mixed with washing water by suppressing abnormal foaming to be predicted.

SOLUTION: A dish washer includes: a suction pipe 17 continuously connected to the middle part of a discharge pipe 6 which leads from a washing pump 5 to a spray nozzle 4; and a foaming detecting means for detecting an increase in the bubbles generated in a washing tub 2, wherein when the foaming detecting means detects the increase in the bubbles during a washing operation, control is performed to reduce the ability of the washing pump 5 and to drive the pump for a prescribed time.



JAPANESE

[JP,2005-000511,A]

Drawing selection Representative drawing

CLAIMS DETAILED DESCRIPTION TECHNICAL
FIELD PRIOR ART EFFECT OF THE INVENTION
TECHNICAL PROBLEM MEANS DESCRIPTION OF
DRAWINGS DRAWINGS

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

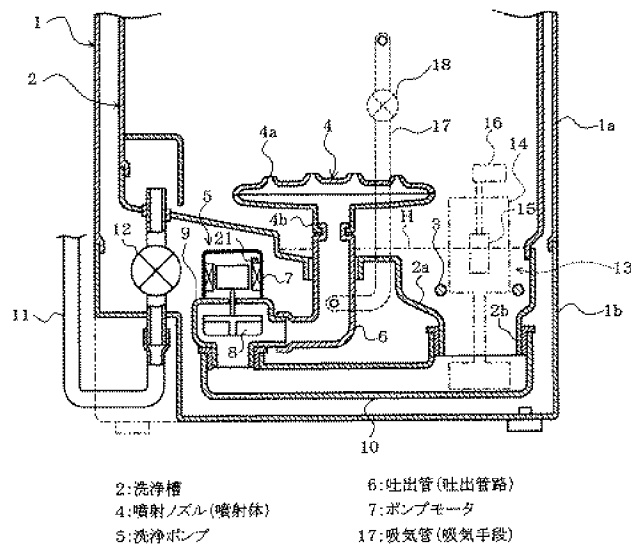
[Field of the Invention]

This invention relates to the dish washer which aimed at improvement in a cleaning effect by injection of the wash water containing air bubbles.

[0002]

[Description of the Prior Art]

Circulating through the wash water to which water was supplied in the cleaning tank as a cleaning means in a dish washer generally, it pressurizes with a washing pump and sends to the injection nozzle as an injection body, and he applies the water jet from this injection nozzle to food utensils, and is trying to wash it. Therefore, when it is in this cleaning means and is going to heighten a detergency, it is possible to lengthen cleaning time, or to raise detergent concentration, and to expect detergent capability etc., but now, it becomes conditioning disadvantageous also for it not



[Translation done.]

being not only desirable but a user from a point of saving resources or environmental protection.

[0003]

Then, the state which introduced air into the water jet breathed out from a washing pump as other means, and was mixed with wash water, and the composition injected to a washed object as what is called air bubbles are thought out (for example, refer to patent documents 1).

According to this, it can contribute to washing of dirt using the energy released when the air bubbles in the injected wash water break, and improvement in a detergency can be expected together with an exfoliation operation of the adhering dirt by water jet.

[0004]

[Patent documents 1]

JP,2000-166845,A (the 4th page, drawing 1)

[0005]

[Problem to be solved by the invention]

By the way, the wash water which this seed dish washer needs is the few amount of water of the grade which can carry out circulation use effectively with a washing pump, and since warm water is used for it, activation of a detergent is urged to it, and since wash water collides with a washed object or an inner-wall-of-tank side, it is under the condition which the bubble by a detergent tends to generate. Then, in the cleaning means which incorporated air bubbles into wash water like the above, although the low foaming detergent is generally adopted, since it is in the tendency which promotes foaming further, it is easy to generate many detergent bubbles. If it results in a lot of foaming states especially, the problem used as rotation of an injection nozzle or the hindrance of water jet will be produced, As a result, the discharge capacity declines by inhaling air bubbles with the wash water through which a washing pump circulates, and the fault of an expected detergency's not being obtained and the bubble which it was full of leaking out outside from the atmosphere of a cleaning tank and a part open for free passage is predicted.

[0006]

This invention is made in view of an above-mentioned situation, therefore the purpose can perform washing operation using air bubbles smoothly, avoiding the problem by detergent foaming, and is to provide the dish washer which can expect improvement in a detergency.

[0007]

[Means for solving problem]

To achieve the above objects, the dish washer of this

invention, The cleaning tank in which food utensils were accommodated, the injection body provided in this cleaning tank, and the washing pump fed to said injection body circulating through the wash water in a cleaning tank, In the thing possessing the suction means which introduces air into a discharge pipeline until wash water is breathed out through said injection body from said washing pump, and a foaming detection means to detect the increase in the bubble by which it was generated in said cleaning tank, When the increase in a bubble is detected by said foaming detection means at the time of washing operation, the capability of said washing pump is lowered and it controls to carry out a predetermined time drive (invention of Claim 1).

[0008]

According to this composition, improvement in a detergency is expectable by the cleaning means using air bubbles, avoiding the fault by the increase in an unusual bubble.

[0009]

In the thing according to claim 1, the foaming detection means was considered as the composition following the input change of a pump motor (invention of Claim 2).

[0010]

According to this composition, it is what paid its attention to the input change by a load change when air bubbles are inhaled in a washing pump, and it can be quick and the detection signal of the increase in a bubble can be acquired certainly.

[0011]

[Mode for carrying out the invention]

(A 1st embodiment)

Hereafter, it explains with reference to drawing 1 in which the 1st working example of this invention is shown - drawing 4.

First, drawing 1 is drawing of longitudinal section showing the outline composition of the important section of a dish washer, and the case 1 which forms the coat of a dish washer comprised the upper frame 1a and the lower part frame 1b, and has established the cleaning tank 2 in the inside. This cleaning tank 2 is carrying out the opening only of the front, can take the above-mentioned dish drainer in and out of this opening, and is in the composition covered by the door (not shown) which usually opens and closes this opening while it makes the rectangle case shape which accommodates the food utensils stored to the dish drainer which is not illustrated so that receipts and payments are possible.

[0012]

While the hollow 2a caudad hollow in part is formed in the inner bottom of the above-mentioned cleaning tank 2 and allocating the heater 3 for wash water heating in this, opening formation of the water flow port 2b is carried out to the minimum part. Two places (one place is illustrated) are equipped with the injection nozzle 4 as an injection body at the inner bottom of the cleaning tank 2. Free passage connection is made via the washing pump 5 and the discharge tube 6 which were allocated in the outsole part side of the cleaning tank 2, and this injection nozzle 4 injects the wash water fed from this pump 5 from two or more nozzles 4a to the upper part. The injection nozzle 4 is supported by the upper bed part of the above-mentioned discharge tube 6 pivotable, and is considering the tubed base 4b under [that] a center section as the composition which rotates according to counteraction of water jet, and the passage which results in this injection nozzle 4 constitutes the so-called discharge pipeline of the washing pump 5 from this discharge tube 6.

[0013]

The above-mentioned washing pump 5 comprises the pump motor 7, the impeller 8, and the pump case 9, Free passage connection of the discharge side of the pump case 9 is made through said discharge tube 6 at the injection nozzle 4, on the other hand, free passage connection is made via the water flowing pipe 10 at said water flow port 2b, and the suction side of this casing 9 constitutes the so-called siphon way of the washing pump 5. Therefore, if the washing pump 5 drives, the wash water in the cleaning tank 2 is inhaled from the above-mentioned water flowing pipe 10 (siphon way), the discharge tube 6 (discharge pipeline) is fed and it is injected from the injection nozzle 4, and washing operation will be performed, repeating this circulation.

[0014]

One end is connected to a waterworks faucet (not shown) outside the plane as a water supply means which supplies wash water (tap water) to the lower part of the cleaning tank 2, and the service pipe 11 with which free passage connection of the other end was made into the cleaning tank 2 is formed via the feed valve 12 on the way.

It has the water level detection means 13 for controlling such feed water by a water supply means to the specified quantity. Although this is in the float type general water level detection means 13 and a detailed graphic display and explanation are omitted, As a two-dot chain line shows roughly in drawing 1, the float 15 is formed in the water level case 14 which was open for free passage to said water

flowing pipe 10, and it has composition which operates the microswitch 16 according to floating of this float 15.

[0015]

And the suction means for introducing air in this discharge pipeline is provided in the part in the middle of the discharge tube 6 of the inside which constitutes said discharge pipeline from this example. This suction means is provided with the inlet pipe 17 of the shape of a small tube which made free passage connection of the lower end part to the part in the middle of the discharge tube 6, at least, at least wash water is located above (the predetermined water level H shows among a figure), the upper bed part of this inlet pipe 17 is carrying out the communicating opening to the atmosphere, and free passage connection is made by this example in the upper part of the cleaning tank 2. Providing the opening and closing valve 18 in the upper part of this inlet pipe 17, the passage of this inlet pipe 11 is selectively considered as interception and the composition which can be opened for free passage (opening).

[0016]

As the connection with this inlet pipe 11 and discharge tube 6 is shown in the enlarged drawing of the important section of drawing 2, the tubed communication trunk part 19 prolonged in the side of the discharge tube 6 is provided, and free passage connection of the lower end part of said inlet pipe 17 is made in this heel. And it has composition which inclines in accordance with the direction of a stream (graphic display upper part) which is projected a little to the inner direction of the discharge tube 6, and is shown by a solid line arrow and which was formed projected part 20 and the cylindrical opening also opened for free passage to the slanting upper part in connection with this in the toe of this communication trunk part 19.

Therefore, when wash water is fed by the solid line arrow direction in the inside of the discharge tube 6 by the pump action by the washing pump 5 according to this connection configuration and the made suction means, At least by 20 copies of projected parts, since a passage is narrowed, the increase of the rate of flow and a pressure differential arise and pipe internal pressure declines (negative pressure), air is incorporated from the inlet pipe 17, and as a dashed line arrow shows in drawing 2, introduction is made certainly possible easily in the discharge tube 6.

[0017]

although not illustrated, a navigational panel is provided in the front face of the case 1, and the operational input by two or more washing course selection keys, start keys, etc. is

made possible -- both, In response to the input signal by a foaming detection means to detect the increase in the bubble in the rotation sensor 21 formed in said water level detection means 13 or the pump motor 7 mentioned later, and the cleaning tank 2, the control device which controls operation of a dish washer at large is provided.

[0018]

However, if it attaches and states to the above-mentioned rotation sensor 21 first, this will adopt a DC brushless motor as the pump motor 7 described above in this example,

Revolving speed of the pump motor 7 concerned is made detectable using a well-known hole IC as a position detecting element of this motor, for example, a rotor.

Variable control of the pump motor 7 which consists of this DC brushless motor is carried out in revolving speed via the inverter circuit which is not illustrated by the control device which received input signals, such as the above-mentioned foaming detection means, although mentioned later for details.

[0019]

And the above-mentioned foaming detection means has a function which detects the increase in a bubble using the above-mentioned rotation sensor 21. That is, the increasing state of foaming in the cleaning tank 2 is detected, the case where it is generated by a lot of bubbles based on the collision etc. of the air incorporated from the detergent at the time of washing operation or said suction means and the water jet from the injection nozzle 4 can be considered, and the increasing state of this bubble is detected.

Drawing 3 explains the function of the foaming detection means, and these Drawings are what extracted the part in the "washing distance" of a general standard course, and showed the rotation characteristic of the washing pump 5 in the washing operation, The revolving speed of the pump motor 7 is specifically shown, and operation control is usually carried out with the revolving speed s_0 (rpm).

[0020]

However, if it will result by the time a foaming state increases and it is incorporated into the washing pump 5, a load operation (resistance) of water will decrease temporarily and the revolving speed of the pump motor 7 will rise. When the rotation sensor 21 by the above-mentioned hole IC detects the high speed s_1 which exceeds this stationary rotational speed s_0 , foaming judges it as the state where it is increasing exceeding a normal state, and functions as what is called a foaming detection means.

[0021]

Therefore, the increase in the bubble by which it was generated in drawing 3 now is started (at the mark t1 time), If bubble detection by the foaming detection means which results in the high speed s1 and consists of the rotation sensor 21 is performed (at the mark t2 time), in response to the detection signal, the roll control of said control device will be carried out to the revolving speed s2 which lowered the revolving speed of the pump motor 7 from the stationary rotational speed s0. and the washing operation by this revolving speed s2 -- predetermined time -- for example, it is made to carry out for 5 minutes, and he returns to the stationary rotational speed s0 again after 5-minute progress, and is trying to continue operation

[0022]

That is, in these 5 minutes, the discharge capacity of the washing pump 5 can be weakened by the revolving speed of the pump motor 7 being lowered, and while the vigor of water jet is also reduced, the air introduced into the discharge tube 6 from the inlet pipe 17 may also decrease, and a foaming phenomenon may be suppressed, and may return even to an after that usual state. Then, in 5 minutes (the mark t3 shows), he returns to the stationary rotational speed s0, and is trying to prevent the fall of a detergency as much as possible. If the washing operation by the stationary rotational speed s0 is started again, the foaming detection means by the rotation sensor 21 will be validated, and operation control which supervised the foaming state will be performed.

[0023]

In addition, although controlled by the above-mentioned standard course to perform 3 times of "rinse distance", for example, and to usually perform "dry distance" after "washing distance", although detailed explanation is omitted, It has the pump for wastewater as a means to drain the wash water between each distance, the dryer style (neither is illustrated) which introduces the open air and carries out stoving temperature weathering in order to perform "dry distance", etc.

[0024]

Next, the operation of a dish washer considered as the above-mentioned composition is explained.

first -- if a start key is operated by carrying out selection setting of the standard course which is usually boiled by operation course selection key operation, and is used and an operation start is carried out -- said -- it carried out -- as -- "-- Wash. - by rinsing, although operated automatically, here mainly explains - dry distance" per [in "washing distance"]

operation hereafter. A deer is carried out and tap water is supplied by operation start operation in the cleaning tank 2 from the feed valve 12. If these water supply amounts reach the predetermined setting water level H shown in drawing 1, the microswitch 16 will operate by rise floating of the float 15 of the water level detection means 13, and water level detection will be performed.

[0025]

And the control device which is not illustrated in response to the signal of this water level detection closes the feed valve 12, and drives the washing pump 5. In this case, it is carried out, for example for about twenty minutes the time when "washing distance" was set up, the detergent prepared beforehand being thrown in in the cleaning tank 2, and energization generation of heat also of the heater 3 being carried out, and heating wash water. If the pump motor 7 drives and the impeller 8 rotates in the washing operation in this "washing distance" as described above, the wash water inhaled in the pump case 9 from the water flowing pipe 10, Dirt is washed together with the detergency which is injected above from two or more nozzles 4a, the inside of the discharge tube 6 being fed, resulting in the two injection nozzles 4, and this injection nozzle 4 rotating, and is applied to washed objects, such as tableware accommodated in the dish drainer which does not illustrate this water jet, and a detergent has.

[0026]

However, since free passage connection of the inlet pipe 17 is made at the discharge tube 6 and the opening and closing valve 18 is usually in a release position, air is introduced using the negative pressure phenomenon by the side of the discharge pipeline by a pump action. In particular, in this example, as shown in drawing 2, in the communication trunk part 19, the projected part 20 which projects in the method of the inside of the discharge tube 6 is formed, since air is made easy to attract, it is stabilized, and the air of the specified quantity can be continued and introduced. Therefore, it becomes air bubbles about the inside of the discharge tube 6, and is fed with wash water, and it is breathed out from the injection nozzle 4 and, as for this air, effective detergency is performed with the detergency by a detergent using the energy with a washed object which collides, and is released when destroyed.

[0027]

Since it foams in the washing operation which mixed such air bubbles and is easy to carry out, if this bubble increases in the cleaning tank 2, The fault of barring the rotating

operation of the injection nozzle 4, and the bubble which also weakened the vigor of the water jet and which it was full of in a detergency making it fall invading into the atmosphere in the cleaning tank 2, the part which was open for free passage, an exhaust port, a dryer style which are not illustrated, for example, etc. by extension, or leaking out outside is produced. In addition, the water level of the wash water in the cleaning tank 2 falls from the predetermined water level H with circulation use of wash water, and becomes that it is easy to be inhaled with the bubble on this water surface at the washing pump 5 side. Therefore, if air bubbles come to reach the washing pump 5, the discharge capacity of the washing pump 5 will begin to decline, and also if it goes on, an idle condition will increase, and it results in the state where sufficient detergency is not obtained.

[0028]

However, an increase of the air bubbles incorporated into the washing pump 5 will detect that the revolving speed of the pump motor 7 increased temporarily as indicated in drawing 3 (revolving speed s_1), and the bubble increased because the rotation sensor 21 detects this. That is, it functions as a foaming detection means and is controlled to be set as the revolving speed s_2 lower than the prescribed rotational speed s_0 , and to carry out predetermined time (here for 5 minutes) execution of the revolving speed of the pump motor 7 in response to this detection result.

[0029]

And if the washing operation by the revolving speed s_2 passes for 5 minutes, it is again set as the predetermined revolving speed s_0 , and if there is no increase in the bubble which bars especially detergency, it will be continued till the end of a set period of the as it is remainder. However, since the surveillance of the foaming detection means by the rotation sensor 21 is continued also after that, if the foaming state which declined increases again temporarily, this is detected, repeat execution of the same control as the above is carried out, and the problem accompanying the abnormal occurrence of a bubble can be avoided.

[0030]

However, the cleaning time in this standard course, For example, since it is set up in about twenty minutes beforehand, multiple-times repeat execution is possible for operation by the low speed rotation s_2 which detected the increase in the above-mentioned bubble, and it is considered repeatedly according to foaming detection that the washing pump 5 is also obliged to operation by the low rotation

speed s_2 depending on the case. Although it is natural, detergency has the anxiety which falls further as a detergency serves as the tendency to fall, especially its frequency of bubble detection increases. Then, washing operation effective in washing which incorporated air bubbles can be performed, suppressing extension of time as much as possible, if it controls to extend the cleaning time of "washing distance" according to this when multiple-times execution of the operation by the low rotation speed s_2 based on a foaming detection means is carried out as a measure, for example. Thus, also when anxious about the fall of a detergency, it is effective as an operation control means which aims at improvement in a detergency, being able to cope with it easily if needed and preventing generating of an unusual bubble.

[0031]

Although the detailed explanation after the above "washing distance" is omitted, following "rinse distance" is performed in the almost same washing mode as the above, introduction of air is performed from the inlet pipe 17 also in this case, and a rinse is effectively performed in the detergency which incorporated air bubbles. However, in "rinse distance", a detergent composition is operated with expected revolving speed, without a foaming detection means functioning, since it has faded. And drying by warm air by the dryer style which finally shifts to "dry distance" and is not illustrated is performed, and a series of automatic operation distance from washing of the washed object slack food utensils in a standard course to desiccation is finished.

When not asking for the cleaning means which incorporated the above-mentioned air bubbles from the beginning, in using a high-concentration detergent, for example, If the opening and closing valve 12 is operated and closed beforehand, the inlet pipe 17 can be intercepted with the atmosphere, it is not introduced, but air is changed to the conventional general washing operation, and it can perform it, and can cope with beforehand the washing operation which the abnormal occurrence of a bubble tends to produce.

[0032]

As explained above, according to this example, it has the following effect.

In the time of the washing operation in "washing distance", since the inlet pipe 17 was connected to the discharge pipeline side by the pump action by the washing pump 5, air can be introduced easily. In this example, it is easy to introduce air by having composition of the communication

trunk part 19 which formed the projected part 20 shown in drawing 2 using a pressure differential, and is much more certain in **, and introduction of the continuously stable air is possible. As a result, the wash water which mixed air bubbles can be turned to a washed object, it can inject effectively, dirt can be effectively washed out together with the detergency of a detergent, and a detergency improves.

[0033]

The inlet pipe 17 will fully function, if the end is open for free passage to the atmosphere, but. Since free passage connection of the opening of an air inlet side is made like this example in the upper part of the cleaning tank 2, even if it makes it the steam which fear of leakage of water does not have outside even if wash water flows into this inlet-pipe 17 side, for example in the reactionary operation in a stop of the washing pump 5 etc., and also is produced in drying operation etc., it does not leak out outside.

[0034]

In the cleaning means which incorporated air bubbles as mentioned above on the other hand, since it is easy to generate a bubble, when this bubble increases unusually, we are anxious about the fault of leaking out to a fall and the exterior of a detergency. If it will result by the time a bubble increases and air bubbles are especially inhaled by the washing pump 5, the fall of pumping power will not be escaped. By however, the thing for which the tendency for the revolving speed of the pump motor 7 to rise temporarily will be caught, and the increase in this revolving speed will be detected with the rotation sensor 21 if this example shows to drawing 3 and air bubbles are inhaled by the washing pump 5 like. Since it was made to function as what is called a foaming detection means that enabled it to detect the time of a bubble increasing, when this detection signal is received, change control of the revolving speed of the pump motor 7 is carried out at the low rotation speed s2.

[0035]

A pump action becomes weaker, this can also weaken the vigor of the water jet from the injection nozzle 4, and since the air simultaneously introduced into the discharge pipeline side also begins to decrease, calming of a bubble is expectable by the foaming phenomenon in the cleaning tank 2 being suppressed, and predetermined time (for 5 minutes) continuation being carried out. Therefore, since the washing operation by the low rotation speed s2 returns to predetermined time of after usual operation, Since operation is not continued, with pumping power lowered and it is always supervising by the foaming detection means during

washing operation, Since the washing pump 5 will be driven with the stationary rotational speed s_0 which is original pumping power if it returns to the usual foaming state while being able to prevent beforehand an unusual foaming state which interferes with washing operation, the cleaning means using air bubbles can be utilized effectively, and a good cleaning effect can be expected.

[0036]

While adopting the DC brushless motor as the pump motor 7, catch change of the revolving speed of this motor 7 in accordance with the increase in a bubble using the rotation sensor 21 using a hole IC, consider it as a foaming detection means, and made it function in the above-mentioned working example, but. Not only this but when an induction motor is adopted as the pump motor 7, for example, it can adopt as a foaming detection means changed as follows by detecting a current value (good also at a pressure value) with a meter transformer etc.

[0037]

Drawing 4 is what showed the input (current) characteristic of the induction motor as the pump motor 7 under washing operation, and shows the state where current changes with the increase in a bubble especially. That is, since the water pressure load of the washing pump 5 is gradually reduced from t_1 before t_2 the time of arriving at an increase limit mostly at the increase start time of the air bubbles mixed in the 5 casks of washing pump pump case 9 with the increase in a bubble, the current value of the pump motor 7 carries out downward change (current value $i_0 \rightarrow i_1$).

[0038]

Therefore, when it detects having measured the input change to which this pump motor 7 descends, for example, having reached the specified value, it can use that the bubble increased as a foaming detection means to detect. And when the detection result of the foaming is obtained, it is easily possible at a control means, such as dropping the voltage which what is necessary is just to change to the washing operation by predetermined time (for example, for 5 minutes) low rotation speed like the above-mentioned working example, and is applied to the pump motor 7, or lowering drive frequency. Thus, even if it is in an induction motor, the same operation effect as the above-mentioned working example is expectable using the foaming detection means following the input change accompanying the increase in a bubble.

In addition, it changes variously that a pressure sensor is formed as a foaming detection means via the air tube which

was open for free passage to the cleaning tank 2 although not illustrated, and it may be made to detect a foaming state using the pressure fluctuation by invasion of the bubble to this air tube etc., and it is feasible it. [it]

[0039]

To the above-mentioned working example, drawing 5 - drawing 7 are what showed the 2nd - the 4th working example of this invention, give identical codes to the 1st working example of the above, and identical parts, and omit explanation, and only a different portion is explained.

[0040]

(A 2nd embodiment)

Before long, in order that drawing 5 may show the outline composition of the whole dish washer in which the 2nd working example of this invention is shown, from a different direction, drawing 1 is seen drawing of longitudinal section, and this thing, In the inlet pipe 22 for introducing the air in this example, it is that it is only different in that the piping configurations differ, and others are as common as the 1st working example of the above. That is, the inlet pipe 22 of this example is using the air inlet side as the water level case 14 which constitutes the water level detection means 13 with the piping configuration which made free passage connection to the inlet pipe 17 shown in the 1st working example of the above having made the opening of the air inlet side which is the end the piping configuration which made free passage connection in the upper part of the cleaning tank 2. This water level case 14 makes the hollow box shape which is open for free passage to the water flowing pipe 10, and has the float 15 inside, and that canopy portion is closed so that aeration is possible, and it is considering it as the composition in which the float 15 can surface according to the rise of a water level. And free passage connection of the end of the inlet pipe 22 is made to the field to which at least the indifferent water of the upper part of this water level case 14 does not go up. Free passage connection of the other end of the inlet pipe 22 is made like the above-mentioned working example at the discharge tube 6 of the washing pump 5 (not shown).

[0041]

Therefore, even if it is in the inlet pipe 22 of this composition, air can be incorporated via the water level case 14, the air introduced in the discharge tube 6 is injected from the injection nozzle 4 with wash water, and washing operation effective in washing which incorporated air bubbles can be performed.

The operation effect as the 1st working example of the

above in which this example is also almost the same is obtained -- even if water may flow into the inlet-pipe 22 side concerned with sufficient vigor according to counteraction of a stop of the circulating pump 5 etc., since it is recoverable in the water level case 14, wash water does not leak outside.

[0042]

(A 3rd embodiment)

Subsequently, drawing 6 is an enlarged drawing fracturing and showing a part of injection body slack injection nozzle 23 which shows the 3rd working example of this invention. This thing is what established the suction means which introduces air into this injection nozzle 23 that constitutes the end of a discharge pipeline, and the composition of foaming detection means other than this suction means, etc. is as common as the 1st working example of the above. The fundamental composition which injects the wash water in which this injection nozzle 23 also had two or more nozzles 23a on the upper surface, and has been fed through the tubed base 23b from each nozzle 23a to the upper part is as common as the 1st working example of the above. However, in this example, it has composition which formed the suction passage 24 (one place is illustrated) formed in the base of each nozzle 23a so that one end might be open for free passage to the atmosphere and the other end might meet inside [base] this nozzle 23a, and this functions as a suction means which introduces air.

[0043]

That is, according to the injection nozzle 23 of the above-mentioned composition, when wash water is injected with sufficient vigor by the solid line arrow direction from the nozzle 23a, as air shows by a dashed line arrow from the suction passage 24 according to the pressure differential, it is inhaled, and it mixes with wash water immediately, it becomes air bubbles, and is injected from the nozzle 23a. While the improvement in the detergency same as a cleaning means as each above-mentioned working example using air bubbles is expectable by this, generating of an unusual bubble can be suppressed by the same foaming detection means as the above.

[0044]

Since the intake pipeline which connects between other parts since the suction means is especially provided in the injection nozzle 23 by this example is not needed, it is advantageous the point in the case 1 which does not complicate the pump drive part circumference in particular, and effective also at the point that distribute from each

nozzle 23a and air bubbles are injected. While being able to perform easily conversion with other models which do not need the cleaning means by air bubbles by exchange of only the injection nozzle 23, Since it is possible to combine by incorporating the injection nozzle 23 and to constitute a suction means, the effect which carries out suitable to practical use, such as excelling in assembly-operation nature, and it being advantageous also in cost and being, is expectable.

[0045]

(A 4th embodiment)

And although it is common to the point of having established the suction means which introduces air into this injection nozzle 25 that drawing 7 is an enlarged drawing fracturing and showing a part of injection nozzle 25 which shows the 4th working example of this invention, and constitutes the end of a discharge pipeline especially to the 3rd working example of the above, in the concrete composition, it differs as follows.

That is, even if it is in this example, it is the composition of the injection nozzle 25 which makes common fundamental composition of the nozzle 25a, the tubed base 25b, etc., but the suction means in this example is considered as the composition which established the suction passage 26 in the side of the above-mentioned tubed base 25b. It has composition of the suction passage 26 which is open for free passage to the slanting upper part so that may carry out a deer, and this suction passage 26 may be located in the tubed base 25b located in the upper part at least from usual wash water, and it may project to an inner direction and the flow direction (above [which is shown by a solid line arrow]) of wash water may be met.

[0046]

Therefore, while being inhaled as air shows by a dashed line arrow from the suction passage 26 according to the pressure differential when wash water is fed by the solid line arrow direction in the tubed base 25b of the injection nozzle 25, even if it is in this composition, it mixes with wash water immediately, it becomes air bubbles, and is injected from each nozzle 25a. And when the increase in the bubble by a foaming detection means is detected, it is to carry out drive controlling of the pump motor 7 to low rotation speed at each above-mentioned working example and the appearance. While the improvement in the detergency same as a cleaning means as each above-mentioned working example using air bubbles is expectable by this, it has the same operation effect as the 3rd working example of the

above -- it can provide simply -- by having provided the suction means in the injection nozzle 25.

[0047]

This invention is not what is limited only to each working example which was described above and shown in Drawings, For example, may be the injection body which was replaced with the injection nozzle pivotable as an injection body, and was provided fixed, and, An air pump is formed in the air inlet side of an inlet pipe as a suction means, and within limits which do not deviate from the summary of this invention when carrying out, it changes variously that it is good also as composition which can introduce air regularly etc., and can carry out it. [it] [it]

[0048]

[Effect of the Invention]

The dish washer of this invention can provide the dish washer which can expect improvement in a detergency, avoiding the increase in an unusual bubble by the cleaning means which used air bubbles so that clearly from having stated above.

[Brief Description of the Drawings]

[Drawing 1] Drawing of longitudinal section showing the outline composition of the important section of the dish washer in the 1st working example of this invention

[Drawing 2] The expanded sectional view of an important section

[Drawing 3] The figure showing the rotation characteristic of the washing pump at the time of washing operation

[Drawing 4] The figure showing the input characteristics of the washing pump at the time of washing operation

[Drawing 5] Drawing of longitudinal section showing the outline composition of the whole dish washer in the 2nd working example of this invention

[Drawing 6] The enlarged drawing of an important section fracturing and showing a part of 3rd working example of this invention

[Drawing 7] The enlarged drawing of an important section fracturing and showing a part of 4th working example of this invention

[Explanations of letters or numerals]

2 -- a cleaning tank, and 4, 23 and 25 -- an injection nozzle (injection body) and 5 -- a washing pump and 6 -- a discharge tube (discharge pipeline) and 7 -- a water level case, and 17 and 22 show 24, an inlet pipe (suction means) and 26 show a suction passage (suction means), and, as for a pump motor and 13, 25b shows a tubed base, as for a feed

water detection means and 14.

[Translation done.]